

MatrikonOPC Modbus Driver

User's Manual

MatrikonOPC Modbus Driver

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This manual is a product of Matrikon Inc.

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Document Revision History:

| Date | Document Version | Description | Author |
|------------|------------------|---|---------|
| 2006-06-01 | 1.0 | Initial document | |
| 2006-10-18 | 1.1 | Merge from old template and update for new release. | CB |
| 2007-06-29 | 2.0 | Update template, general edit, update for new release (i.e., Omni functionality). | CD |
| 2007-11-12 | 2.1 | Updated Item syntax and installed file sections. | ZA |
| 2008-07-01 | 2.2 | Updates for 4.3.0.0. | MH |
| 2008-07-10 | 3.0 | Version updated to 4.3.0.0. Added the following: <ul style="list-style-type: none">• Creating and Configuring a Redundancy Group Object• Getting Data without Being Connected to a Device• Appendix E OPC Security Custom Interface• Appendix F Offline Mode | MH, LB |
| 2008-09-08 | 3.1 | Version updated to 4.3.1.0. Appendix E OPC Security Custom Interface replaced with updated Appendix E Security. | LB |
| 2008-09-09 | 3.2 | Installed Files section updated. Modbus Address field description updated in the following Creating and Configuring sections: Modbus Ethernet PLC (TCP/IP) Device, Serial Device, MTL Serial Device, Terminal Server PLD Device, UPD Device. Troubleshooting section updated. | TNM, LB |
| 2008-09-15 | 3.3 | Version updated to 4.3.2.0. | REK |

| | | | |
|------------|-----|---|---------|
| 2008-09-22 | 3.4 | Installation and Un-Installation sections updated to reflect new installer. Installed Files section updated. Replaced Security appendix with newest version. | LB |
| 2008-12-05 | 3.5 | Updated with support information for Modbus+ SA85 or PCI85 Card. | JFY |
| 2008-12-08 | 3.6 | Added View Tags and Security Settings descriptions to Tools menu. Replaced Configuration screen graphic with updated screenshot showing View Tags and Security Settings icons. Enter Password screen added to Installation section. | LB |
| 2009-09-10 | 4.0 | Updates for version 4.5.0 of the Modbus driver. | CHB, LB |
| 2010-01-04 | 5.0 | Updated product version to 4.5.1. Removed references to MTL 8000 device. | SL, LB |
| 2010-01-08 | 5.1 | Updated Sample Item IDs (Table 20). | ZB, LB |
| 2010-01-27 | 5.2 | Software Requirements section updated. | AB, LB |

SOFTWARE VERSION

Version: 4.5.1

DOCUMENT VERSION

Version: 5.2

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Introduction

This MatrikonOPC™ Modbus Driver is an OPC product that enables data interchange between OPC clients and Modbus-compliant devices. Each read/write with the device is optimized to maximize throughput. This driver can be configured with the following connection types:

- Modbus Serial (RS-232, RS-422, or RS-485, as available on the user's computer)
- Ethernet (TCP/IP or UDP)

The limit on the number of connections is determined by the user's computer RAM and the number of physical ports available for use. There are no limits built into the OPC driver itself.

This driver supports the following operations:

- Modbus

This product is commonly used in many industries. Modbus is a standard protocol.


Who Should Use This Manual

This manual is intended for use by all users of the MatrikonOPC Modbus Driver.

This manual explains how to install and configure the software, and how to perform common tasks. In addition, technical information about OPC data items is included, along with sections on diagnostics and troubleshooting.

Overview of Manual

This document uses icons to highlight valuable information. Remember these icons and what they mean, as they will assist you throughout the manual.

| | |
|---|---|
|  | This symbol denotes important information that must be acknowledged. |
| BOLD | Font displayed in this color and style indicates a hyperlink to the applicable/associated information within this document, or if applicable, any external sources. |

The *User's Manual* has been designed so that you can click on references in the document to jump to that referenced point without having to scroll through several pages (in some cases). For example, if you were to see the sentence "Refer to Figure 1 for more information", pressing the **CTRL** key and clicking your mouse on the text "Figure 1" will automatically take you to the location of Figure 1 within the document.

This manual consists of several sections and is structured as follows:

- **Introduction** – this introductory chapter.
- **Getting Started** – provides information on the minimum system requirements, and how to contact MatrikonOPC's Support team.
- **Configuration** – shows how to configure the driver, and describes each component in detail, including windows/screens, panels, tabs, and menu commands.
- **OPC Data Items** – describes the driver's items.
- **Troubleshooting** – provides solutions for common problems that may be encountered, and answers to frequently asked questions.

References

This document references information found within the following documents/sites:

- www.opcfoundation.org
- www.matrikonopc.com
- www.opcsupport.com
- www.modbus.org
- *Modicon Modbus Protocol Reference Guide*
- *Modbus Application Protocol Specification*

Document Terminology

The terms *screen* and *window*, and *tab* and *panel* are used interchangeably throughout this document.

Table 1 provides a list of definitions for terms used throughout this document.

| Term/Abbreviation | Description |
|--------------------|--|
| ACL | Access Control List. |
| COM | Component Object Model. A method for organizing software, specifying how to build components that can be dynamically interchanged. |
| DA | OPC Data Access. Provides access to real-time process data. |
| DCOM | Distributed Component Object Model. An extension of COM that allows communication between COM components over a network. |
| DDE | Dynamic Data Exchange. Allows the transfer of data between two running applications. |
| FIFO | First In, First Out. The way data stored in a queue is processed. |
| HDA | OPC Historical Data Access. |
| Matrikon | Matrikon Inc. |
| MatrikonOPC | Matrikon's brand name for its OPC servers and clients. |
| OPC | A communication standard. Refer to www.opcfoundation.org for more information. |
| PLC | Programmable Logic Controller. |

Table 1 - Terms and Definitions

Getting Started

This chapter contains important information about configuring the driver and how to contact Matrikon's Support team.

The **System Requirements** section shows how to avoid future problems by ensuring that the system meets the minimum software and hardware requirements.

Refer to the **Licensing** section for information on how to obtain the appropriate license. The Licensing section will refer you to the *Licensing Procedures* document that was installed along with the driver and this *User's Manual*. The **Contacting Support** section provides you with contact information for the MatrikonOPC Support team, should you have any problems during the installation or licensing of the software.

System Requirements

The software has minimum **Software** and **Hardware** system requirements. These requirements must be met for the software to function properly.

Software Requirements

The driver requires the following software:

- Microsoft Windows XP SP2, or
- Microsoft Windows 2003, or
- Microsoft Windows 2000 SP4
- Microsoft .NET 2.0 Framework (included with this install program)



Note: It is recommended that the most current service packs are installed.

Hardware Requirements

The driver requires the following hardware:

- Intel® Pentium® 4 Processor
- 512 MB RAM
- 40 GB 7200 RPM hard drive

The driver requires the additional hardware listed below to make use of the following functionality:

- For Ethernet communication with Modbus devices: Windows-compatible Ethernet network card.
- For Serial communication with Modbus devices: Windows-compatible Serial Port.

Modbus Implementation

For information about Modbus, refer to the documentation found at www.modbus.org.

Table 2 lists and describes the supported features.

| Function Code | Description | Supported? |
|---------------|-------------------|------------|
| 01 | Read Coil Status | YES |
| 02 | Read Input Status | YES |

| Function Code | Description | Supported? |
|---------------|------------------------------------|------------|
| 03 | Read Holding Registers | YES |
| 04 | Read Input Registers | YES |
| 05 | Force Single Coil | |
| 06 | Preset Single Register | YES |
| 07 | Read Exception Status | |
| 11 | Fetch Communications Event Counter | |
| 12 | Fetch Communications Event Log | |
| 15 | Force Multiple Coils | YES |
| 16 | Present Multiple Registers | YES |
| 17 | Report Slave ID | |
| 20 | Read General Reference | |
| 21 | Write General Reference | |
| 22 | Mask Write 4X Register | |
| 23 | Read/Write 4X Registers | |
| 24 | Read FIFO Queue | |

Table 2 - Supported Features

Installed Files

The MatrikonOPC Modbus Driver may be installed as a UCS driver module or as a stand-alone OPC server. The installation program copies all necessary files to the target computer and creates short-cut icons in the **Start** menu.

For information on non-driver-specific files that are installed on the system, please refer the *MatrikonOPC Universal Connectivity Server User's Manual* or the *MatrikonOPC Server User's Manual*.

The driver specific files listed in Table 3 are installed by default, if the driver is installed as a stand-alone server, in the following location:

C:\Program Files\Matrikon\OPC\Modbus

| File Name | Description |
|---|--|
| MatrikonOPC Modbus Driver Release Notes.pdf | <i>Release Notes</i> for this driver. |
| MatrikonOPC Modbus Driver User Manual.pdf | <i>User's Manual</i> for this driver. |
| OPCModbus.exe | Driver executable. |
| PSTCFGModiconLib.ocx | Driver ActiveX configuration panel. |
| Videos/Modbus Ethernet.wmv | Instructional video demonstrating how to set up Ethernet Modbus. |
| Videos/Modbus Serial.wmv | Instructional video demonstrating how to set up Serial Modbus. |

Table 3 - Files Installed in "Modbus" Folder (For Stand-Alone Server)

The driver-specific files listed in Table 4 are installed by default, if the driver is installed as a UCS driver module, in the following location:

C:\Program Files\Matrikon\OPC\UCS\Drivers\Modbus

| File Name | Description |
|---|--|
| MatrikonOPC Modbus Driver Release Notes.pdf | <i>Release Notes</i> for this driver. |
| MatrikonOPC Modbus Driver User Manual.pdf | <i>User's Manual</i> for this driver. |
| ModbusSIL.dll | Driver module. |
| PSTCFGModiconLib.ocx | Driver ActiveX configuration panel. |
| Videos/Modbus Ethernet.wmv | Instructional video demonstrating how to set up Ethernet Modbus. |
| Videos/Modbus Serial.wmv | Instructional video demonstrating how to set up Serial Modbus. |

Table 4 - Files Installed in "Modbus" Folder (For UCS Driver Module)

Licensing

Most MatrikonOPC products require some form of licensing criteria be met to ensure that it functions successfully

The MatrikonOPC Modbus Driver supports **both** hardware and software licensing.

IMPORTANT TO NOTE:

The following licensing information is described in detail within the *Licensing Procedures* document which accompanies the MatrikonOPC Modbus Driver software and *User's Manual*:



- Hardware and software key licensing information.
- Information about the MatrikonOPC Licensing Utility that is used to license driver software, and the variety of ways in which licenses can be obtained (e.g., Internet Connection, Web Page, Email).
- Licensing Q&A and Troubleshooting.

Contacting Support

The MatrikonOPC Customer Services department (www.opcsupport.com) is available 24 hours a day, seven days a week.

Contact MatrikonOPC Support using the information below, or send an email (support@MatrikonOPC.com).

For Monday to Friday **daytime support** requests, contact MatrikonOPC Support using the regional phone numbers provided in Table 5.

| Region | Office Hours | Contact Information |
|--|-----------------|-------------------------|
| North America UTC/GMT -7 hours (MST) | 8:00 am-5:00 pm | +1-877-OPC-4-ALL |
| Europe /Africa * | 9:00 am-5:00 pm | +49-221-969-77-0 |

| Region | Office Hours | Contact Information |
|---|-----------------|--|
| UTC/GMT +1 hours (CET) | | (Request OPC Support) |
| Middle East * UTC/GMT +3 hours | 9:00 am-5:00 pm | +973-174-65363 |
| Australia/Asia * UTC/GMT +10 hours (AEST) | 9:00 am-5:00 pm | +61-2-4908-2198 (Request OPC Support) |

* Toll-free regional numbers coming soon!

Table 5 - MatrikonOPC Support Regional Contact Information

For **after-hours support** in all regions, please use either of the following numbers. There is no extra charge from MatrikonOPC for calling their after-hours support numbers.

| Region | Contact Information |
|------------|------------------------------------|
| All | +1-780-231-9480 +1-780-264-6714 |

Table 6 - After-Hours Support

Configuration

The driver's GUI allows users to view and alter configuration parameters at run time. When a user views a configuration parameter, the information is retrieved and displayed. The updated parameters are sent as a group to the driver when submitted.

Minimal configuration of the MatrikonOPC Modbus Driver is required for it to function properly, but users can customize the driver's behaviour as required. This chapter shows you how to configure the driver and describes each component in detail, including the windows, panels, and menu commands.

The **Driver Configuration** section describes in detail how to configure the driver.

Driver Configuration

The driver requires minimal configuration for it to run properly. You can also customize the driver's behaviour as required. This section shows users how to create and edit objects using the **Configuration** window.

Creating Objects

The **Insert New Object** and **Create New** windows are used to create Modbus Device Link objects.

Insert New Object Window

The **Insert New Object** window (Figure 1) displays a different set of options depending on the type of object selected and the types of objects already configured under it.

Note: Use the scroll bar at the bottom of the window to view all available options. Figure 1 shows two views of the same window so that you can see all of the available options; one view with the scroll bar moved to the left, and one with the scroll bar moved to the right.

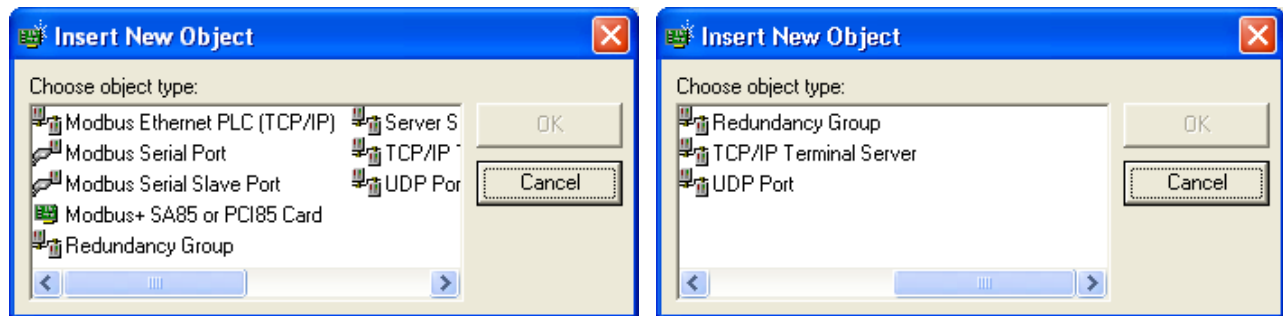


Figure 1 - Insert New Object Window


Table 7 describes the types of objects that are available for insertion as a child in the **Insert New Object** window, depending on the object currently selected.

| Selected Object | Insert New Object Window Options |
|------------------------------------|--|
| Modbus (Root Configuration) | Modbus Ethernet PLC (TCP/IP) Modbus Serial Port Modbus Serial Slave Port Modbus+ SA85 or PCI85 Card Redundancy Group Server Status List TCP/IP Terminal Server |

| Selected Object | Insert New Object Window Options |
|---|----------------------------------|
| | UDP Port |
| Modbus Ethernet PLC (TCP/IP) | Not available. |
| Modbus Serial Port | Modbus Serial Device |
| Modbus Serial Slave Port | Modbus Serial Device |
| Modbus+ SA85 or PCI85 Card - *Note: This option will only be available if driver of the card is installed. | Modbus+ Device |
| Redundancy Group | Not available. |
| TCP/IP Terminal Server | Terminal Server PLC |
| UDP Port | Modbus UDP Device |

Table 7 - Objects Available Under Insert New Object Window

To insert a new object:

1. On the **Configuration** window, either select the **Define New** menu option from the **Edit** menu, or click on the  icon.
2. The **Insert New Object** window (Figure 1) appears.
3. From the displayed list, select the type of object to be created.

Note: Different objects may be available depending on which object is currently selected in the tree view.

4. Click on the **OK** button.
5. The **Create New** window appears.

To create a newly inserted object:

1. From the **Create New** window, enter a name for the object. This name is part of the item ID that globally identifies data items from under the object. Users may also choose to enter a description of the object.
2. Edit the configuration components as desired.
3. Click on the **OK** button. The object is created.

Note: For the object to be used for communication, it must be enabled (i.e., **Enabled** checkbox is selected). This can be done at any time.

Create New Window

A device-specific window is displayed for each Modbus device:

- **Modbus Ethernet PLC (TCP/IP)**
- **Modbus Serial Port**
- **Modbus Serial Slave Port**
- **Modbus+ SA85 or PCI85 Card**
- **Redundancy Group**
- **Server Status List**

- **TCP/IP Terminal Server**
- **UDP Port**
- **Modbus Serial Device**
- **Terminal Server PLC**
- **Modbus UDP Device**

The following sections contain information on the types of objects available and how to create and configure them.

Creating and Configuring a Modbus Ethernet PLC (TCP/IP) Device

The **Create New** window (Figure 2) displays the settings available for a connection to a Modbus Ethernet PLC (TCP/IP) device.

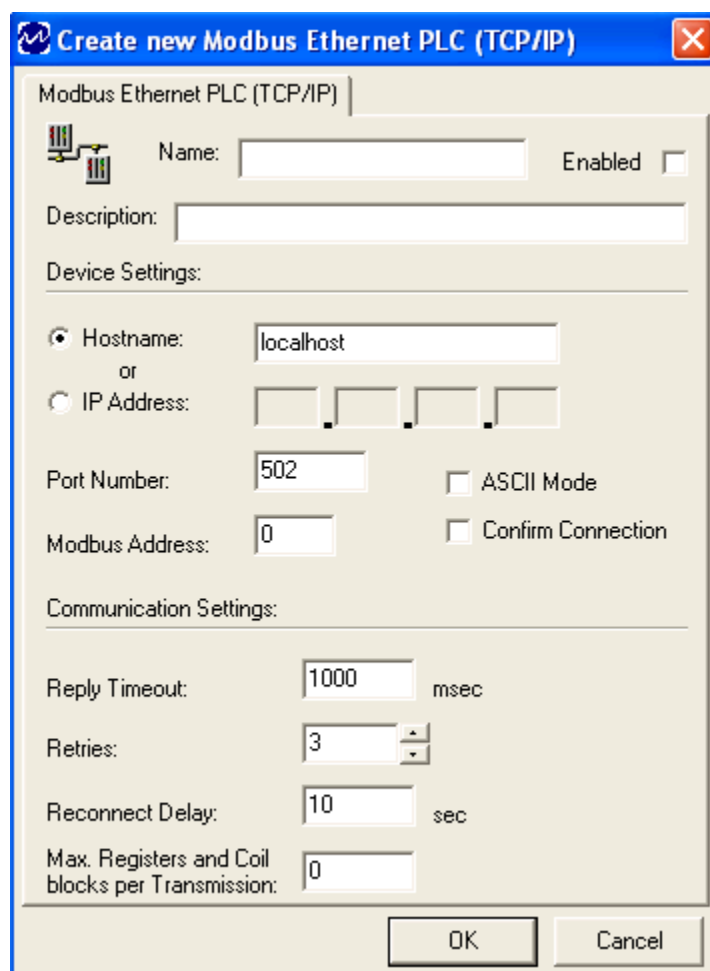


Figure 2 - Create New Modbus Ethernet PLC (TCP/IP) Window


Table 8 describes the components of the **Create New Modbus Ethernet PLC (TCP/IP)** window.

| Component | Description |
|-------------|--|
| Name | Name of the object, which becomes an element of the item ID for data items under the object. |

| Component | Description |
|--|--|
| | Automatically converted to title case for display purposes. |
| Enabled | Use this checkbox to enable (i.e., checkbox is selected) or disable (i.e., checkbox is cleared) communication for the object. |
| Description | This field is optional, takes any user-defined text (64-character maximum) for documentation purposes. By default, this field is blank. |
| Hostname | The network name of the device. |
| IP Address | The IP address of the device. |
| Port Number | The TCP port on which the device is listening. |
| Modbus Address | The Modbus address of the device (maximum length of 255). If set to 0 , writing to this device will cause a Modbus broadcast message to go out to all devices on the communications port, writing to all devices simultaneously. When using a Modbus address of 0, you cannot read tags through the device link. Change the address to match the address of the Modbus slave from which you wish to read data. |
| ASCII Mode | If this checkbox is selected, communication will occur in ASCII mode. |
| Confirm Connection | If this checkbox is selected, a read will occur on register 0:00001 to verify the connection by trying to read the point. |
| Reply Timeout | The number of milliseconds to wait before a timeout occurs (maximum of 30000 milliseconds). |
| Retries | The number of retries if timeouts occur (maximum of 10). |
| Reconnect Delay | The number of seconds to wait before re-trying the connection (maximum of 3600 seconds). |
| Max. Registers and Coil blocks per Transmission | The maximum number of registers to read/write per transmission (maximum of 123). Setting this value to 0 will cause the server to select the optimal size. |

Table 8 - Create New Modbus Ethernet PLC (TCP/IP) Window Components

To create a Modbus Ethernet PLC (TCP/IP) device:

- On the **Configuration** window, select the **Modbus** configuration item and either:
 - Right-click your mouse and select **Define New** from the menu that appears, or
 - Select the **Define New** menu option from the **Edit** menu, or
 - Click on the  icon.
- The **Insert New Object** window (Figure 1) appears.
- From the displayed list, select the **Modbus Ethernet PLC (TCP/IP)** object type.
- Click on the **OK** button.
- The **Create New** window appears (Figure 2).

Note: The item selected in the **Insert New Object** window will determine which **Create New** window is displayed. For example, when **Modbus Ethernet PLC (TCP/IP)** is selected, then the **Create New Modbus Ethernet PLC (TCP/IP)** window is displayed.

6. From the **Create New** window, enter a name for the device link.

Note: An error message is displayed when a valid name is not entered. If the entered name is a duplicate of an existing device link, the new device link will not be created. The **Description** field is optional.

7. Edit the configuration components as desired.

Note: For the object to be used for communication, it must be enabled (i.e., the **Enabled** checkbox is selected). This can be done at any time.

8. Click on the **OK** button. The object is created and will appear as a child of the **Modbus** configuration item.

Creating and Configuring a Modbus Serial Port Device

The **Create New** window (Figure 3) displays the settings available for a connection to a Modbus Serial Port.

The **Create New Modbus Serial Port** window consists of two tabs:

- **COMM Port**
- **Advanced Options**

COMM Port Tab

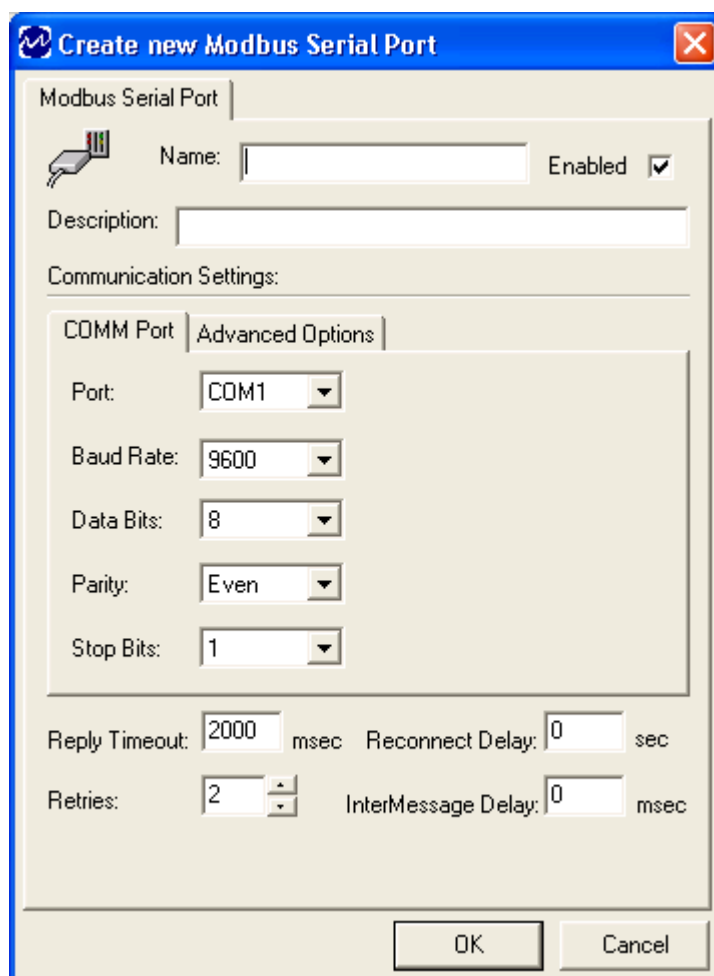


Figure 3 - Create New Modbus Serial Port Window – COMM Port Tab

Table 9 describes the components of the **Create New Modbus Serial Port – COMM Port** tab.

| Component | Description |
|--------------------|---|
| Name | Name of the object, which becomes an element of the item ID for data items under the object. Automatically converted to title case for display purposes. Note: This information stays consistent across both tabs. |
| Enabled | Use this checkbox to enable (i.e., checkbox is selected) or disable (i.e., checkbox is cleared) communication for the object. Note: This information stays consistent across both tabs. |
| Description | This field is optional, takes any user-defined text (64-character maximum) for documentation purposes. By default, this field is blank. Note: This information stays consistent across both tabs. |
| Port | From the drop-down list, select the serial port to which the device is connected. |

| Component | Description |
|---------------------------|---|
| | Default = COM1 |
| Baud Rate | Define the communication rate by selecting a value from the drop-down list. Values range between 110 and 256000 . Default = 9600 |
| Data Bits | Define the number of data bits by selecting a value from the drop-down list. Values range between 4 and 8 . Default = 8 |
| Parity | From the drop-down list, select the type of parity to be used. Options available are None, Odd, Even, Mark, and Space . Default = Even |
| Stop Bits | From the drop-down list, select the number of stop bits. Options available are 1, 1.5, and 2 . Default = 1 |
| Reply Timeout | The number of milliseconds to wait for a device response before a timeout occurs (maximum of 30000 milliseconds). Note: This information stays consistent across both tabs. |
| Retries | The number of retries if timeouts occur (maximum of 10). Note: This information stays consistent across both tabs. |
| Reconnect Delay | The number of seconds to wait before re-trying the connection (maximum of 3600 seconds). Note: This configuration will be overridden by the Reconnect Delay of the Serial Device. Note: This information stays consistent across both tabs. |
| Intermessage Delay | The number of milliseconds to wait between messages (maximum of 60000 milliseconds). This delay can help control traffic load on the serial connection. Note: This information stays consistent across both tabs. |

Table 9 - Create New Modbus Serial Port Window – COMM Port Tab Components

Advanced Options Tab

The **Create New Modbus Serial Port – Advanced Options** tab (Figure 4) displays the advanced settings available for a connection to a serial port.

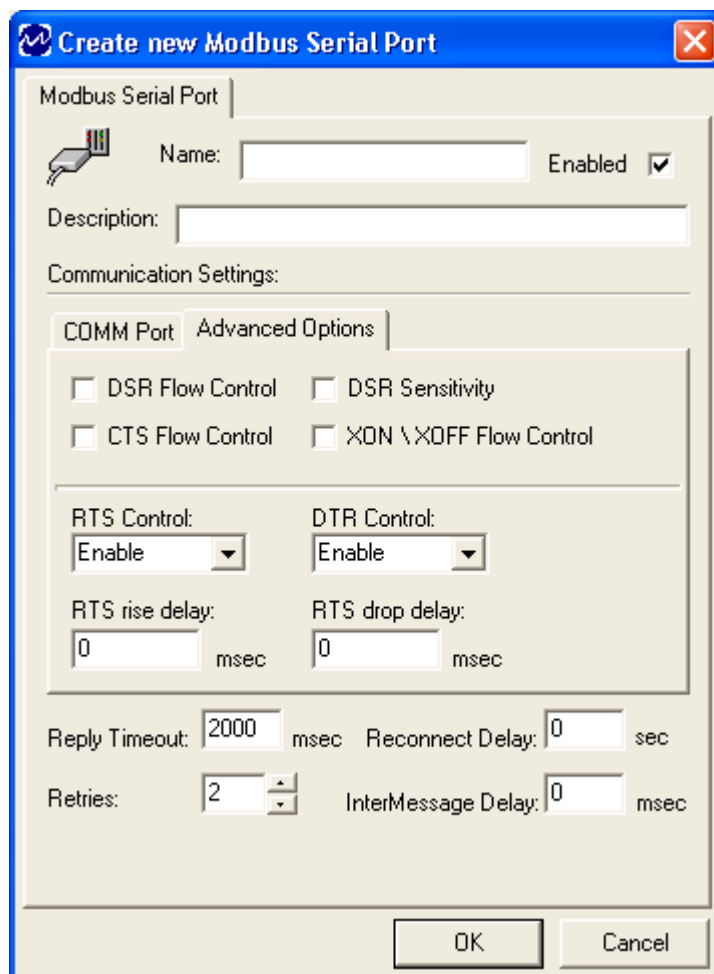


Figure 4 - Create New Modbus Serial Port Window – Advanced Options Tab

Table 10 describes the components of the **Create New Modbus Serial Port – Advanced Options** tab.


| Component | Description |
|-------------------------|---|
| Name | Name of the object, which becomes an element of the item ID for data items under the object. Automatically converted to title case for display purposes. Note: This information stays consistent across both tabs. |
| Enabled | Use this checkbox to enable (i.e., checkbox is selected) or disable (i.e., checkbox is cleared) communication for the object. Note: This information stays consistent across both tabs. |
| Description | This field is optional, takes any user-defined text (64-character maximum) for documentation purposes. By default, this field is blank. Note: This information stays consistent across both tabs. |
| DSR Flow Control | This checkbox allows you to enable (i.e., select the checkbox) or disable (i.e., clear the checkbox) Data Set Ready (DSR) flow control. |

| Component | Description |
|------------------------------|---|
| | Default = checkbox is cleared. |
| CTS Flow Control | This checkbox allows you to enable (i.e., select the checkbox) or disable (i.e., clear the checkbox) Clear To Send (CTS) flow control. Default = checkbox is cleared. |
| DSR Sensitivity | This checkbox allows you to enable (i.e., select the checkbox) or disable (i.e., clear the checkbox) Data Set Ready (DSR). Default = checkbox is cleared. |
| XON/XOFF Flow Control | This checkbox allows you to enable (i.e., select the checkbox) or disable (i.e., clear the checkbox) XON/XOFF software flow control. Default = checkbox is cleared. |
| RTS Control | From the drop-down list, select a Request To Send (RTS) preset. Available options are Disable , Enable , Handshake , and Toggle . Default = Enable |
| RTS rise delay | Allows you to enter the number of milliseconds (to a maximum of 1000) for rise delay. This option available only when RTS Control is set to Enable . Default = 20 |
| DTR Control | Allows you to select a Data Terminal Ready (DTR) preset from the drop-down list. Available options are Disable , Enable , and Handshake . Default = Enable |
| RTS drop delay | Allows you to enter the number of milliseconds (to a maximum of 1000) for drop delay. This option available only when RTS Control is set to Enable . Default = 20 |
| Reply Timeout | The number of milliseconds to wait for a device response before a timeout occurs (maximum of 30000 milliseconds). Note: This information stays consistent across both tabs. |
| Retries | The number of retries if timeouts occur (maximum of 10). Note: This information stays consistent across both tabs. |
| Reconnect Delay | The number of seconds to wait before re-trying the connection (maximum of 3600 seconds). Note: This configuration will be overridden by the Reconnect Delay of the Serial Device. Note: This information stays consistent across both tabs. |
| Intermessage Delay | The number of milliseconds to wait between messages (maximum of 60000 milliseconds). This delay can help control traffic load on the serial connection. Note: This information stays consistent across both tabs. |

Table 10 - Create New Modbus Serial Port Window – Advanced Options Tab Components

To create a Modbus Serial Port device:

1. On the **Configuration** window, select the **Modbus** configuration item and either:

- Right-click your mouse and select **Define New** from the menu that appears, or
 - Select the **Define New** menu option from the **Edit** menu, or
 - Click on the  icon.
2. The **Insert New Object** window (Figure 1) appears.
 3. From the displayed list, select the **Modbus Serial Port** object type.
 4. Click on the **OK** button.
 5. The **Create New** window appears (Figure 3).

Note: The item selected in the **Insert New Object** window will determine which **Create New** window is displayed. For example, when **Modbus Serial Port** is selected, then the **Create New Modbus Serial Port** window is displayed.
 6. From the **Create New** window, enter a name for the device link.

Note: An error message is displayed when a valid name is not entered. If the entered name is a duplicate of an existing device link, the new device link will not be created. The **Description** field is optional.
 7. Edit the configuration components as desired.

Note: For the object to be used for communication, it must be enabled (i.e., the **Enabled** checkbox is selected). This can be done at any time.
 8. Click on the **OK** button. The object is created and will appear as a child of the **Modbus** configuration item.

Creating and Configuring a Modbus Serial Device

Note: A **Modbus Serial Device** can be created as a child of a **Modbus Serial Port** device or a **Modbus Serial Slave Port** device.

The **Create New** window (Figure 5) displays the settings available for a connection to a **Modbus Serial Device**.

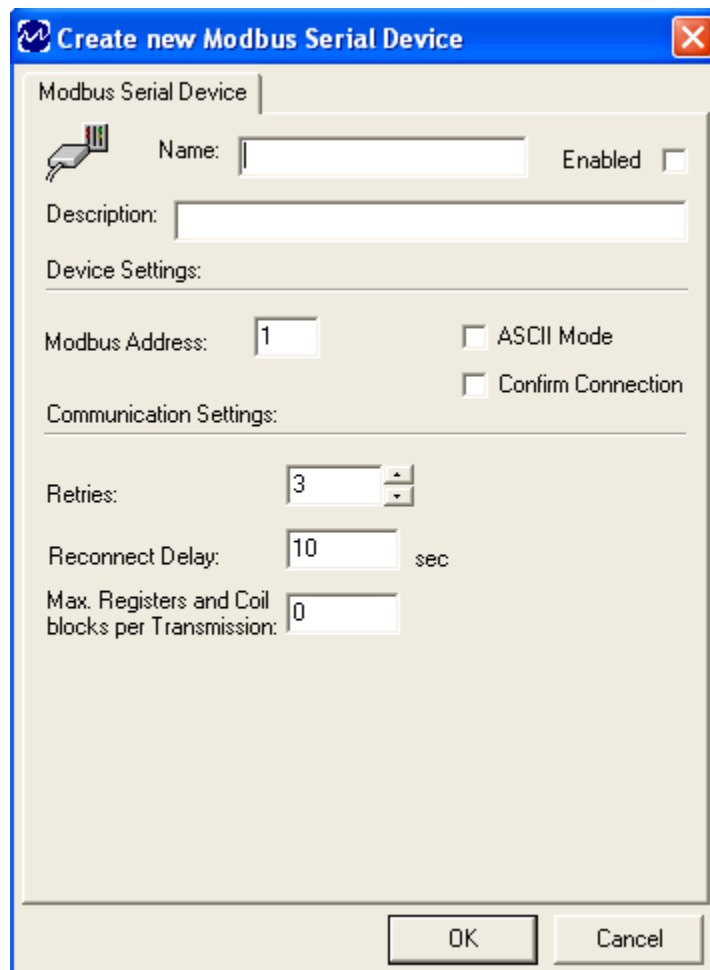


Figure 5 - Create New Modbus Serial Device Window


Table 11 describes the components of the **Create New Modbus Serial Device** window.

| Component | Description |
|-----------------------|--|
| Name | Name of the object, which becomes an element of the item ID for data items under the object. Automatically converted to title case for display purposes. |
| Enabled | Use this checkbox to enable (i.e., checkbox is selected) or disable (i.e., checkbox is cleared) communication for the object. |
| Description | This field is optional, takes any user-defined text (64-character maximum) for documentation purposes. By default, this field is blank. |
| Modbus Address | The Modbus address of the device (maximum length of 255). If set to 0 , writing to this device will cause a Modbus broadcast message to go out to all devices on the communications port, writing to all devices simultaneously. When using a Modbus address of 0, you cannot read tags through the device link. Change the address to match the address of the Modbus slave from which you wish to read data. |

| Component | Description |
|--|---|
| ASCII Mode | If this checkbox is selected, communication will occur in ASCII mode. |
| Confirm Connection | If this checkbox is selected, a read will occur on register 0:00001 to verify the connection by trying to read the point. |
| Retries | The number of retries if timeouts occur (maximum of 10). |
| Reconnect Delay | The number of seconds to wait before re-trying the connection (maximum of 3600 seconds). Note: This configuration will override the Reconnect Delay of the Serial Port. |
| Max. Registers and Coil blocks per Transmission | The maximum number of registers to read/write per transmission (maximum of 123). Setting this value to 0 will cause the server to select the optimal size. |

Table 11 - Create New Modbus Serial Device Window Components

To create a Modbus Serial Device:

- On the **Configuration** window, select a previously-created **Modbus Serial Port** device (for assistance, refer to **Creating and Configuring a Modbus Serial Port Device**) item and either:
 - Right-click your mouse and select **Define New** from the menu that appears, or
 - Select the **Define New** menu option from the **Edit** menu, or
 - Click on the  icon.
- The **Insert New Object** window (Figure 6) appears.

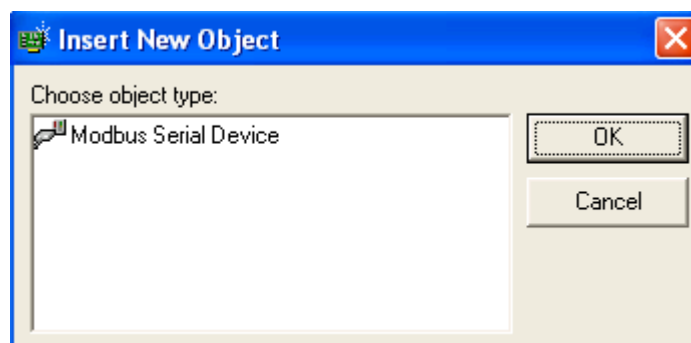


Figure 6 - Insert New Object

- From the displayed list, select **Modbus Serial Device**.
- Click on the **OK** button.
- The **Create New** window (Figure 5) appears.

Note: The item selected in the **Insert New Object** window will determine which **Create New** window is displayed. For example, when **Modbus Serial Device** is selected, then the **Create New Modbus Serial Device** window is displayed.

- From the **Create New** window, enter a name for the device link.

Note: An error message is displayed when a valid name is not entered. If the entered name is a duplicate of an existing device link, the new device link will not be created. The **Description** field is optional.

7. Click on the **OK** button. The object is created and will appear as a child of the **Modbus Serial Port** item.

Creating and Configuring a Modbus Serial Slave Port Device

Note: A **Modbus Serial Device** can be created as a child of a **Modbus Serial Port** device or a **Modbus Serial Slave Port** device. For more information, refer to **Creating and Configuring a Modbus Serial Device**.

The **Create New** window (Figure 7) displays the settings available for a connection to a **Modbus Serial Slave Port**.

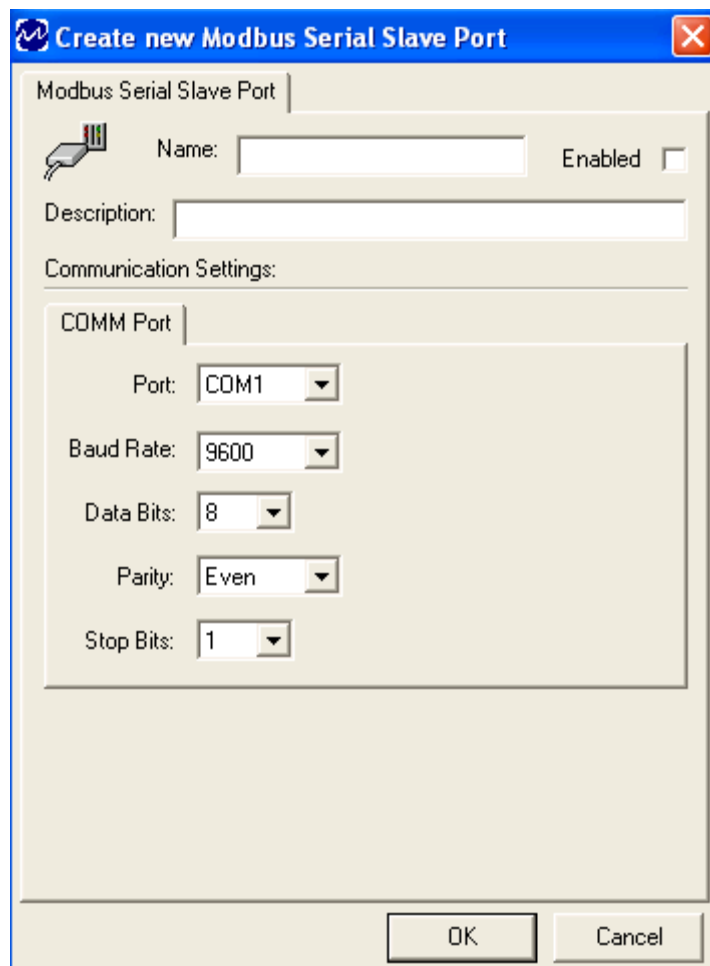


Figure 7 - Create New Modbus Serial Slave Port Window


Table 12 describes the components of the **Create New Modbus Serial Slave Port** window.

| Component | Description |
|--------------------|---|
| Name | Name of the object, which becomes an element of the item ID for data items under the object. Automatically converted to title case for display purposes. |
| Enabled | Use this checkbox to enable (i.e., checkbox is selected) or disable (i.e., checkbox is cleared) communication for the object. |
| Description | This field is optional, takes any user-defined text (64-character |

| Component | Description |
|------------------|--|
| | maximum) for documentation purposes. By default, this field is blank. |
| Port | From the drop-down list, select the serial port to which the device is connected. Default = COM1 |
| Baud Rate | Define the communication rate by selecting a value from the drop-down list. Values range between 110 and 256000 . Default = 9600 |
| Data Bits | Define the number of data bits by selecting a value from the drop-down list. Values range between 4 and 8 . Default = 8 |
| Parity | From the drop-down list, select the type of parity to be used. Options available are None, Odd, Even, Mark, and Space . Default = Even |
| Stop Bits | From the drop-down list, select the number of stop bits. Options available are 1, 1.5, and 2 . Default = 1 |

Table 12 - Create New Modbus Serial Slave Port Window Components

To create a Modbus Serial Slave Port device:

- On the **Configuration** window, select the **Modbus** configuration item and either:
 - Right-click your mouse and select **Define New** from the menu that appears, or
 - Select the **Define New** menu option from the **Edit** menu, or
 - Click on the  icon.

- The **Insert New Object** window (Figure 1) appears.
- From the displayed list, select the **Modbus Serial Slave Port** object type.
- Click on the **OK** button.
- The **Create New** window appears (Figure 7).

Note: The item selected in the **Insert New Object** window will determine which **Create New** window is displayed. For example, when **Modbus Serial Slave Port** is selected, then the **Create New Modbus Serial Slave Port** window is displayed.

- From the **Create New** window, enter a name for the device link.

Note: An error message is displayed when a valid name is not entered. If the entered name is a duplicate of an existing device link, the new device link will not be created. The **Description** field is optional.

- Edit the configuration components as desired.

Note: For the object to be used for communication, it must be enabled (i.e., the **Enabled** checkbox is selected). This can be done at any time.

- Click on the **OK** button. The object is created and will appear as a child of the **Modbus** configuration item.

Creating and Configuring a Modbus+ SA85 or PCI85 Card

The **Create New** window (Figure 8) displays the settings available for a connection to a Modbus+ SA85 or PCI85 Card.

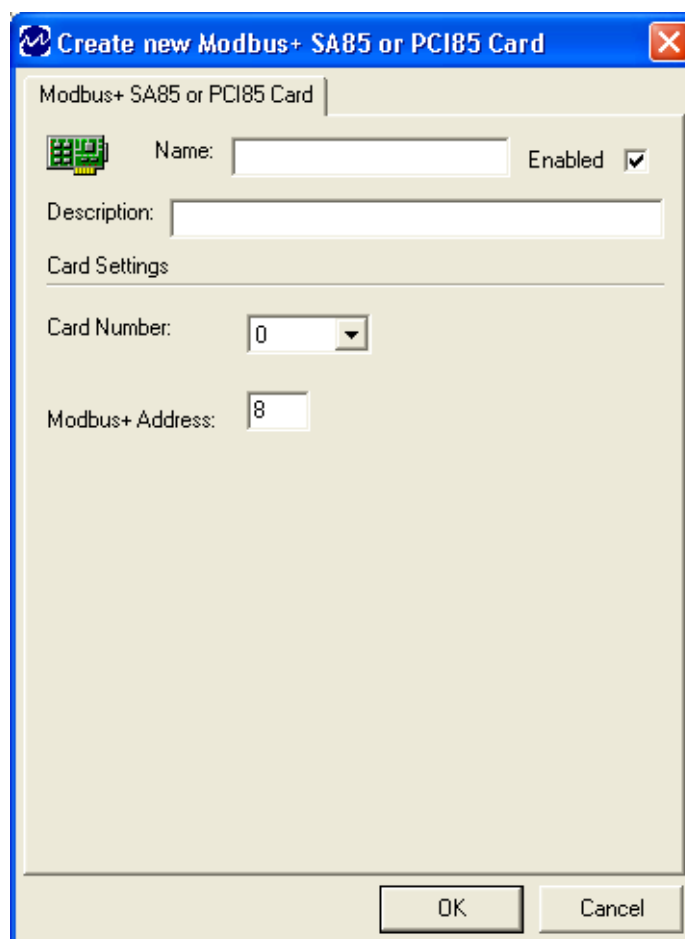



Figure 8 - Create New Modbus+ SA85 or PCI85 Card Window

Table 13 describes the components of the **Create New Modbus+ SA85 or PCI85 Card** window.

| Component | Description |
|------------------------|---|
| Name | Name of the object, which becomes an element of the item ID for data items under the object. Automatically converted to title case for display purposes. |
| Enabled | Use this checkbox to enable (i.e., checkbox is selected) or disable (i.e., checkbox is cleared) communication for the object. |
| Description | This field is optional, takes any user-defined text (64-character maximum) for documentation purposes. By default, this field is blank. |
| Card Number | The card number is the device number of the card installed. |
| Modbus+ Address | The Modbus+ node address of the SA85 or PCI85 card (maximum length of 255). |

Table 13 - Create New Modbus+ SA85 or PCI85 Card Window Components

To create a Modbus+ SA85 or PCI85 Card:

1. On the **Configuration** window, select the **Modbus** configuration item and either:
 - Right-click your mouse and select **Define New** from the menu that appears, or
 - Select the **Define New** menu option from the **Edit** menu, or
 - Click on the  icon.

2. The **Insert New Object** window (Figure 1) appears.

3. From the displayed list, select the **Modbus+ SA85 or PCI85 Card** object type.

4. Click on the **OK** button.

5. The **Create New** window appears (Figure 8).

Note: The item selected in the **Insert New Object** window will determine which **Create New** window is displayed. For example, when **Create New Modbus+ SA85 or PCI85 Card** is selected, then the **Modbus+ Device** window is displayed.

6. From the **Create New** window, enter a name for the device link.

Note: An error message is displayed when a valid name is not entered. If the entered name is a duplicate of an existing device link, the new device link will not be created. The **Description** field is optional.

7. Edit the configuration components as desired.

Note: For the object to be used for communication, it must be enabled (i.e., the **Enabled** checkbox is selected). This can be done at any time.

8. Click on the **OK** button. The object is created and will appear as a child of the **Modbus** configuration item.

Creating and Configuring a Modbus+ Device

Note: A **Modbus+ Device** can be created as a child of a **Modbus+ SA85 or PCI85 Card**. The **Create New** window (Figure 9) displays the settings available for a connection to a Modbus+ Device.

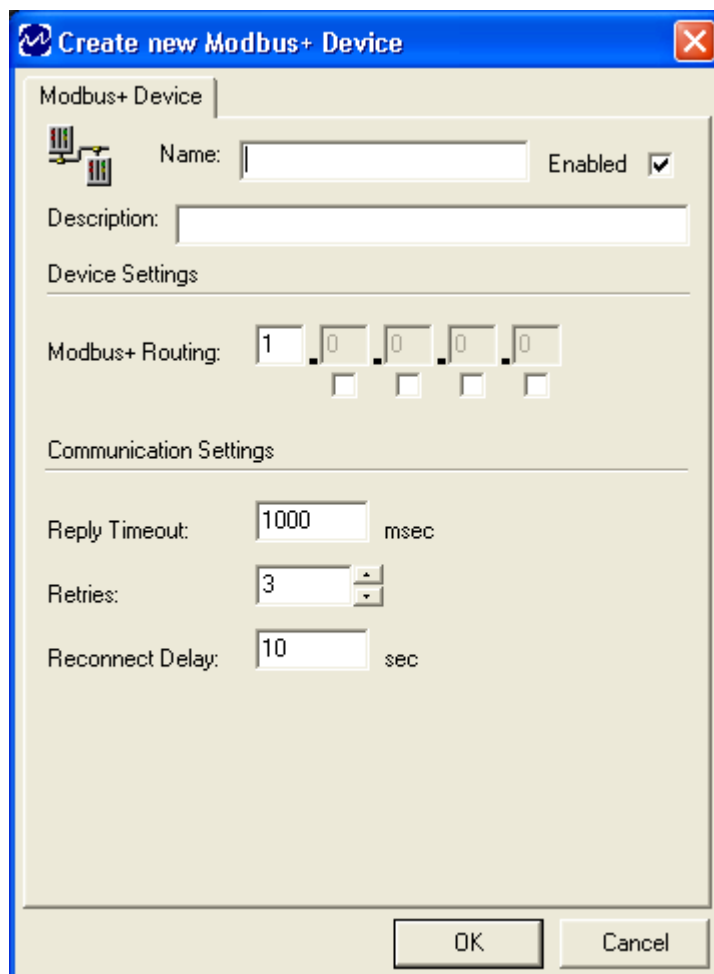


Figure 9 - Create New Modbus+ Device Window


Table 14 describes the components of the **Create New Modbus+ Device** window.

| Component | Description |
|------------------------|---|
| Name | Name of the object, which becomes an element of the item ID for data items under the object. Automatically converted to title case for display purposes. |
| Enabled | Use this checkbox to enable (i.e., checkbox is selected) or disable (i.e., checkbox is cleared) communication for the object. |
| Description | This field is optional, takes any user-defined text (64-character maximum) for documentation purposes. By default, this field is blank. |
| Modbus+ Routing | This is the node address of the controller itself, not the SA85 or PCI85 card. |
| Reply Timeout | The number of milliseconds to wait before a timeout occurs (maximum of 30000 milliseconds). |
| Retries | The number of retries if timeouts occur (maximum of 10). |
| Reconnect Delay | The number of seconds to wait before re-trying the connection |

| Component | Description |
|-----------|----------------------------|
| | (maximum of 3600 seconds). |

Table 14 - Create New Modbus+ Device Window Components

To create a Modbus+ Device:

- On the **Configuration** window, select a previously-created **Modbus SA85 or PCI85 Card** (for assistance, refer to **Creating and Configuring a Modbus+ SA85 or PCI85 Card**) item and either:
 - Right-click your mouse and select **Define New** from the menu that appears, or
 - Select the **Define New** menu option from the **Edit** menu, or
 - Click on the  icon.
- The **Insert New Object** window (Figure 10) appears.

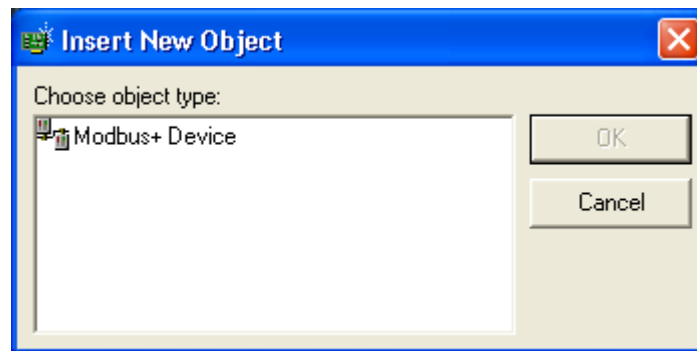


Figure 10 - Insert New Object

- From the displayed list, select **Modbus+ Device**.
- Click on the **OK** button.
- The **Create New** window (Figure 9) appears.

Note: The item selected in the **Insert New Object** window will determine which **Create New** window is displayed. For example, when **Modbus+ Device** is selected, then the **Create New Modbus+ Device** window is displayed.
- From the **Create New** window, enter a name for the device link.

Note: An error message is displayed when a valid name is not entered. If the entered name is a duplicate of an existing device link, the new device link will not be created. The **Description** field is optional.
- Click on the **OK** button. The object is created and will appear as a child of the **Modbus+ SA85 or PCI85 Card** item.

Creating and Configuring a Redundancy Group Object

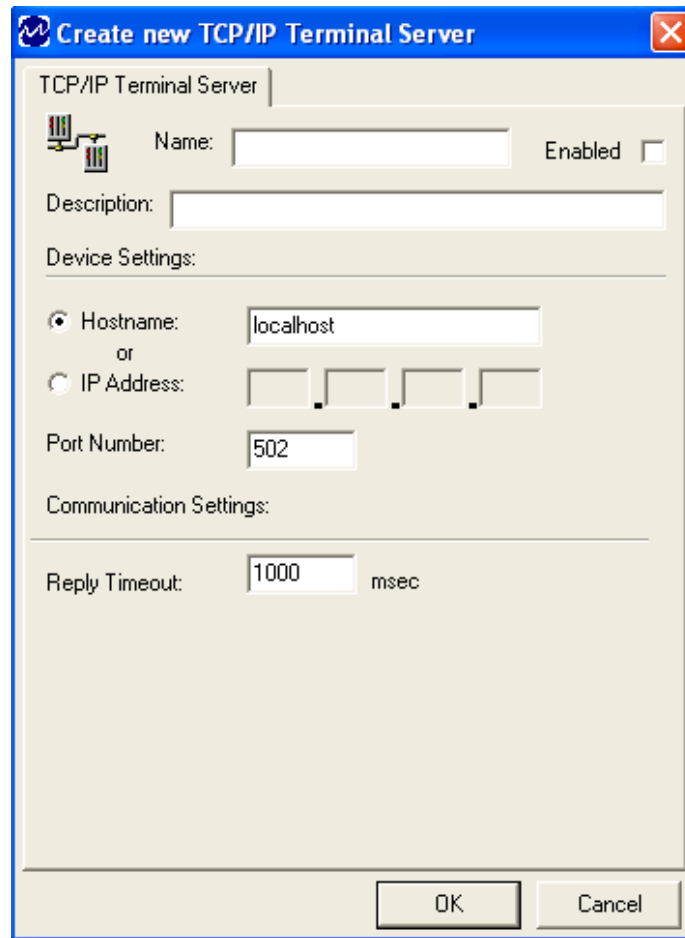
For configuration information of a Redundancy Group object, refer to the *MatrikonOPC Server User's Manual* or the *MatrikonOPC Universal Connectivity Server User's Manual*.

Creating and Configuring a Server Status List

For configuration information of a Server Status List refer to the *MatrikonOPC Server User's Manual* or the *MatrikonOPC Universal Connectivity Server User's Manual*.

Creating and Configuring a TCP/IP Terminal Server Device

The **Create New** window (Figure 11) displays the settings available for a connection to a TCP/IP Terminal Service Device.



The image shows a Windows-style dialog box titled "Create new TCP/IP Terminal Server". It contains several input fields and checkboxes. At the top, there's a "Name:" field and an "Enabled" checkbox. Below that is a "Description:" field. A section titled "Device Settings:" contains two radio buttons: "Hostname:" (selected) with a text field containing "localhost", and "IP Address:" with four separate text boxes for IP octets. Below this is a "Port Number:" field containing "502". A section titled "Communication Settings:" contains a "Reply Timeout:" field containing "1000" and the unit "msec". At the bottom are "OK" and "Cancel" buttons.

Figure 11 - Create New TCP/IP Terminal Server Window


Table 15 describes the components of the **Create New TCP/IP Terminal Server** window.

| Component | Description |
|--------------------|---|
| Name | Name of the object, which becomes an element of the item ID for data items under the object. Automatically converted to title case for display purposes. |
| Enabled | Use this checkbox to enable (i.e., checkbox is selected) or disable (i.e., checkbox is cleared) communication for the object. |
| Description | This field is optional, takes any user-defined text (64-character maximum) for documentation purposes. By default, this field is blank. |
| Hostname | The network name of the device. |
| IP Address | The IP address of the device. |
| Port Number | The TCP port on which the device is listening. |

| Component | Description |
|----------------------|---|
| Reply Timeout | The number of milliseconds to wait before a timeout occurs (maximum of 30000 milliseconds). |

Table 15 - Create New TCP/IP Terminal Server Window Components

To create a TCP/IP Terminal Server device:

1. On the **Configuration** window, select the **Modbus** configuration item and either:
 - Right-click your mouse and select **Define New** from the menu that appears, or
 - Select the **Define New** menu option from the **Edit** menu, or
 - Click on the  icon.
2. The **Insert New Object** window (Figure 1) appears.
3. From the displayed list, select the **TCP/IP Terminal Server** object type.
4. Click on the **OK** button.
5. The **Create New** window appears (Figure 11).

Note: The item selected in the **Insert New Object** window will determine which **Create New** window is displayed. For example, when **TCP/IP Terminal Server** is selected, then the **Create New TCP/IP Terminal Server** window is displayed.

6. From the **Create New** window, enter a name for the device link.

Note: An error message is displayed when a valid name is not entered. If the entered name is a duplicate of an existing device link, the new device link will not be created. The **Description** field is optional.

7. Edit the configuration components as desired.

Note: For the object to be used for communication, it must be enabled (i.e., the **Enabled** checkbox is selected). This can be done at any time.

8. Click on the **OK** button. The object is created and will appear as a child of the **Modbus** configuration item.

Creating and Configuring a Terminal Server PLC Device

The **Create New** window (Figure 12) displays the settings available for a connection to a Terminal Server PLC.

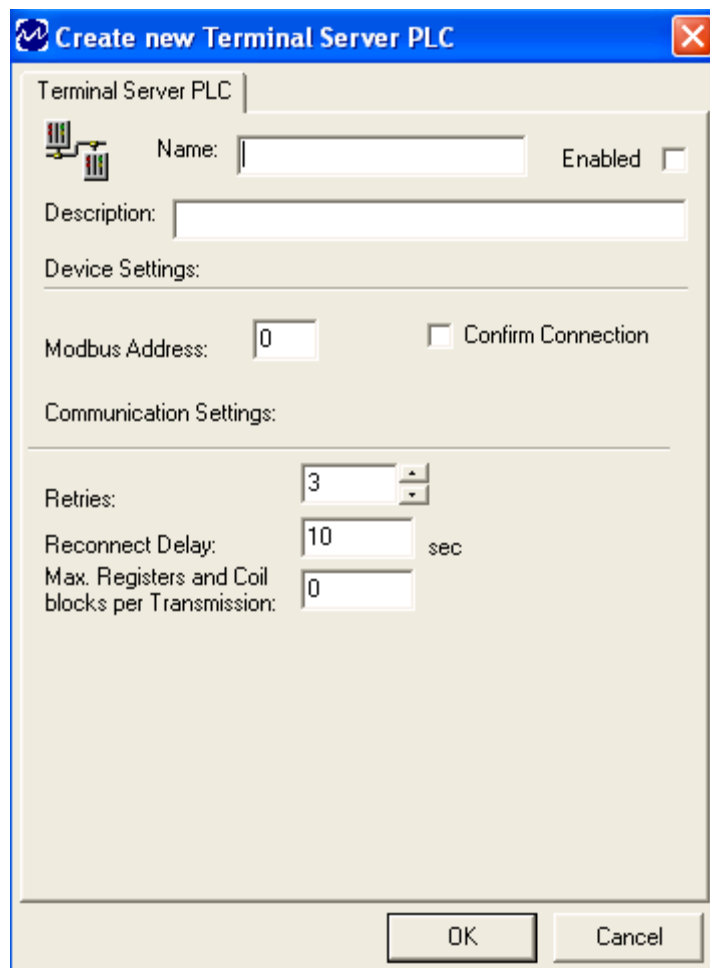


Figure 12 - Create New Terminal Server PLC Window


Table 16 describes the components of the **Create New Terminal Server PLC** window.

| Component | Description |
|-----------------------|--|
| Name | Name of the object, which becomes an element of the item ID for data items under the object. Automatically converted to title case for display purposes. |
| Enabled | Use this checkbox to enable (i.e., checkbox is selected) or disable (i.e., checkbox is cleared) communication for the object. |
| Description | This field is optional, takes any user-defined text (64-character maximum) for documentation purposes. By default, this field is blank. |
| Modbus Address | The Modbus address of the device (maximum length of 255). If set to 0 , writing to this device will cause a Modbus broadcast message to go out to all devices on the communications port, writing to all devices simultaneously. When using a Modbus address of 0, you cannot read tags through the device link. Change the address to match the address of the Modbus slave from which you wish to read data. |

| Component | Description |
|--|---|
| Confirm Connection | If this checkbox is selected, then a read will occur on register 0:00001 to verify the connection. |
| Retries | The number of retries if timeouts occur (maximum of 10). |
| Reconnect Delay | The number of seconds to wait before re-trying the connection (maximum of 3600 seconds). |
| Max. Registers and Coil blocks per Transmission | The maximum number of registers to read/write per transmission (maximum of 123). Setting this value to 0 will cause the server to select the optimal size. |

Table 16 - Create New Terminal Server PLC Window Components

To create a Terminal Server PLC device:

- On the **Configuration** window, select a previously-created **TCP/IP Terminal Server device** (for assistance, refer to **Creating and Configuring a TCP/IP Terminal Server Device**) item and either:
 - Right-click your mouse and select **Define New** from the menu that appears, or
 - Select the **Define New** menu option from the **Edit** menu, or
 - Click on the  icon.
- The **Insert New Object** window (Figure 13) appears.

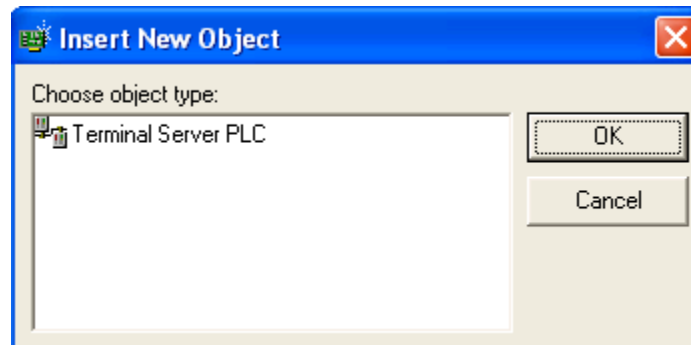


Figure 13 - Insert New Object

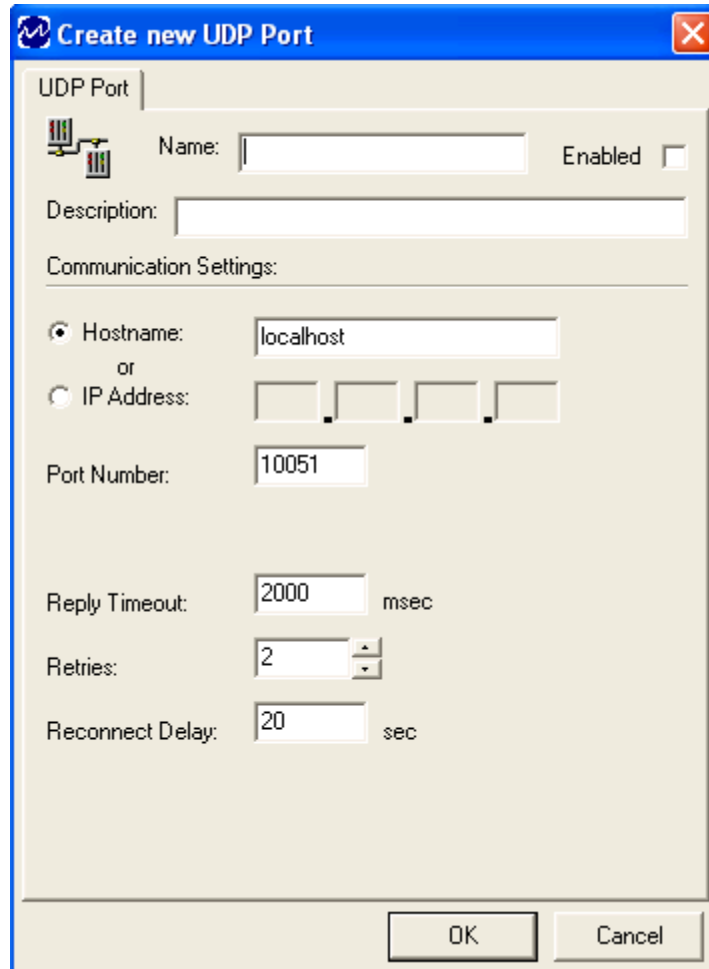
- From the displayed list, select **Terminal Server PLC**.
- Click on the **OK** button.
- The **Create New** window (Figure 12) appears.

Note: The item selected in the **Insert New Object** window will determine which **Create New** window is displayed. For example, when **Terminal Server PLC** is selected, then the **Create New Terminal Server PLC** window is displayed.
- From the **Create New** window, enter a name for the device link.

Note: An error message is displayed when a valid name is not entered. If the entered name is a duplicate of an existing device link, the new device link will not be created. The **Description** field is optional.
- Click on the **OK** button. The object is created and will appear as a child of the **TCP/IP Terminal Server** item.

Creating and Configuring a UDP Port Device

The **Create New** window (Figure 14) displays the settings available for a connection to a UDP Port.



The 'Create new UDP Port' window is a standard Windows-style dialog box with a blue title bar. It contains several input fields and controls for configuring a UDP port device. At the top, there's a 'Name' field and an 'Enabled' checkbox. Below that is a 'Description' text area. The 'Communication Settings' section includes radio buttons for 'Hostname' (selected) and 'IP Address', with corresponding input fields. The 'Port Number' is a text field. At the bottom, there are 'Reply Timeout' (in msec), 'Retries' (a spinner), and 'Reconnect Delay' (in sec) fields. 'OK' and 'Cancel' buttons are at the bottom right.

Figure 14 - Create New UDP Port Window


Table 17 describes the components of the **Create New UDP Port** window.

| Component | Description |
|--------------------|---|
| Name | Name of the object, which becomes an element of the item ID for data items under the object. Automatically converted to title case for display purposes. |
| Enabled | Use this checkbox to enable (i.e., checkbox is selected) or disable (i.e., checkbox is cleared) communication for the object. |
| Description | This field is optional, takes any user-defined text (64-character maximum) for documentation purposes. By default, this field is blank. |
| Hostname | The network name of the device. |
| IP Address | The IP address of the device. |
| Port Number | The TCP port on which the device is listening. |

| Component | Description |
|------------------------|---|
| Reply Timeout | The number of milliseconds to wait before a timeout occurs (maximum of 30000 milliseconds). |
| Retries | The number of retries if timeouts occur (maximum of 10). |
| Reconnect Delay | The number of seconds to wait before re-trying the connection (maximum of 3600 seconds). |

Table 17 - Create New UDP Port Window Components

To create a UDP Port Device:

- On the **Configuration** window, select the **Modbus** configuration item and either:
 - Right-click your mouse and select **Define New** from the menu that appears, or
 - Select the **Define New** menu option from the **Edit** menu, or
 - Click on the  icon.
- The **Insert New Object** window (Figure 1) appears.
- From the displayed list, select the **TCP/IP Terminal Server** object type.
- Click on the **OK** button.
- The **Create New** window appears (Figure 14).

Note: The item selected in the **Insert New Object** window will determine which **Create New** window is displayed. For example, when **UDP Port** is selected, then the **Create New UDP Port** window is displayed.
- From the **Create New** window, enter a name for the device link.

Note: An error message is displayed when a valid name is not entered. If the entered name is a duplicate of an existing device link, the new device link will not be created. The **Description** field is optional.
- Edit the configuration components as desired.

Note: For the object to be used for communication, it must be enabled (i.e., the **Enabled** checkbox is selected). This can be done at any time.
- Click on the **OK** button. The object is created and will appear as a child of the **Modbus** configuration item.

Creating and Configuring a Modbus UDP Device

The **Create New** window (Figure 15) displays the settings available for a connection to a Modbus UDP Device.

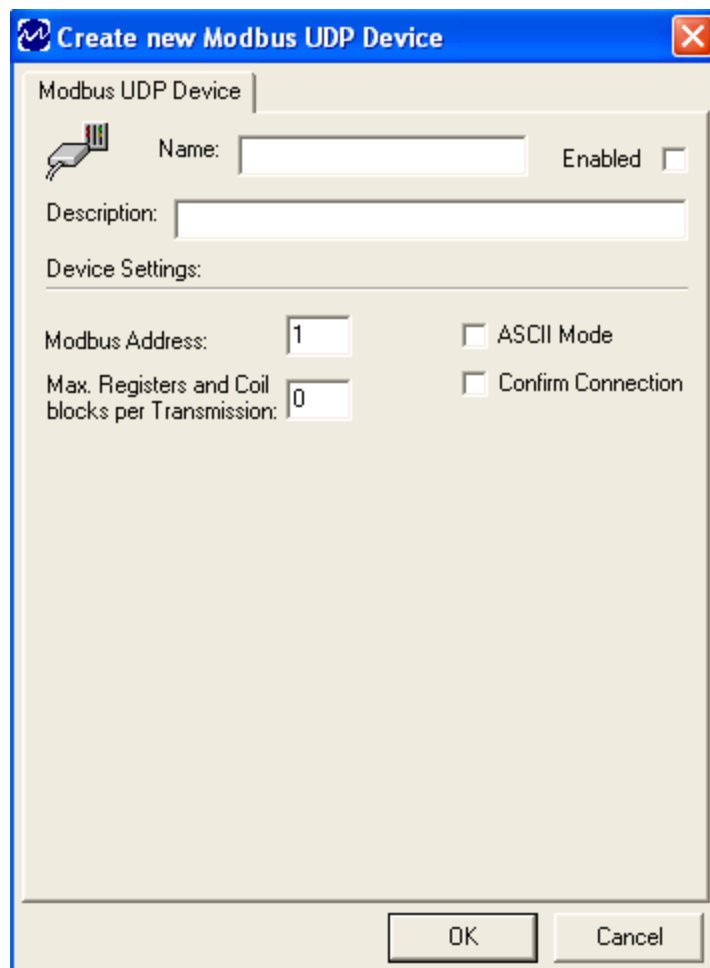


Figure 15 - Create New Modbus UDP Device Window


Table 18 describes the components of the **Create New Modbus UDP Device** window.

| Component | Description |
|-----------------------|--|
| Name | Name of the object, which becomes an element of the item ID for data items under the object. Automatically converted to title case for display purposes. |
| Enabled | Use this checkbox to enable (i.e., checkbox is selected) or disable (i.e., checkbox is cleared) communication for the object. |
| Description | This field is optional, takes any user-defined text (64-character maximum) for documentation purposes. By default, this field is blank. |
| Modbus Address | The Modbus address of the device (maximum length of 255). If set to 0 , writing to this device will cause a Modbus broadcast message to go out to all devices on the communications port, writing to all devices simultaneously. When using a Modbus address of 0, you cannot read tags through the device link. Change the address to match the address of the Modbus slave from which you wish to read data. |

| Component | Description |
|--|---|
| Max. Registers and Coil blocks per Transmission | The maximum number of registers to read/write per transmission (maximum of 123). Setting this value to 0 will cause the server to select the optimal size. |
| ASCII Mode | If this checkbox is selected, communication will occur in ASCII mode. |
| Confirm Connection | If this checkbox is selected, then a read will occur on register 0:00001 to verify the connection. |

Table 18 - Create New Modbus UDP Device Window Components

To create a Modbus UDP Device:

- On the **Configuration** window, select a previously-created **UDP Port** device (for assistance, refer to **Creating and Configuring a UDP Port Device**) item and either:
 - Right-click your mouse and select **Define New** from the menu that appears, or
 - Select the **Define New** menu option from the **Edit** menu, or
 - Click on the  icon.
- The **Insert New Object** window (Figure 16) appears.

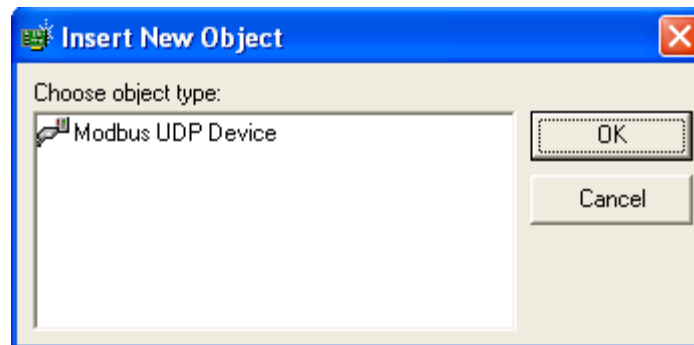


Figure 16 - Insert New Object

- From the displayed list, select **Modbus UDP Device**.
- Click on the **OK** button.
- The **Create New** window (Figure 15) appears.

Note: The item selected in the **Insert New Object** window will determine which **Create New** window is displayed. For example, when **Modbus UDP Device** is selected, then the **Create New Modbus UDP Device** window is displayed.
- From the **Create New** window, enter a name for the device link.

Note: An error message is displayed when a valid name is not entered. If the entered name is a duplicate of an existing device link, the new device link will not be created. The **Description** field is optional.
- Click on the **OK** button. The object is created and will appear as a child of the **UDP Port** item.

OPC Data Items

This section describes the OPC data items used in the MatrikonOPC Modbus Driver.

Modbus Items

The MatrikonOPC Modbus Driver OPC item ID syntax is as follows:

[PORT.]DEVICE.X:YYYYY{ :N }{ D|F|U|P|A }[S][/ZZ]*

Table 19 shows the available item options.

| Field | Description | | | | |
|--------|--|---------------------------------------|---------|------|-------|
| PORT | Name of the SA85 Card, Serial Port, or UDP Port under which the Modbus device appears. Not required for Modbus Ethernet. | | | | |
| DEVICE | Name of the Modbus device. | | | | |
| X | Modbus register file number. Not all devices support all file types. | | | | |
| | File Type | Description | Size | Read | Write |
| | 0 | Digital Output Coil | 1 bit | ✓ | ✓ |
| | 1 | Digital Input Coil | 1 bit | ✓ | |
| | 3 | Analog Input Register | 16 bits | ✓ | |
| | 4 | Analog Output Register | 16 bits | ✓ | ✓ |
| | 3W | Non-Standard Analog Input Register** | 32 bits | ✓ | |
| | 4W | Non-Standard Analog Output Register** | 32 bits | ✓ | ✓ |
| YYYYY | Modbus register address. Possible range is from 1 to 65535 . The actual range depends on the Modbus device configuration for the particular register file type. | | | | |
| D | Append a letter D to the end of an item ID to indicate that the 3X or 4X register pairs up with the next register to form a 32-bit integer. For example, 4:00000D reads the least significant word from 4:00000 and the most significant word from 4:00001. | | | | |
| F | Append a letter F to the end of an item ID to indicate that the 3X or 4X register pairs up with the next register to forma 32-bit IEEE floating-point real. | | | | |
| U | Append a letter U to the end of an item ID to indicate that the 3X or 4X register should be treated as an unsigned rather than a signed 16-bit integer. | | | | |
| S | Append a letter S to the end of an item ID after a D or an F to swap the word order from the default (least significant word in lowest address) reverse format (most significant word in lowest address). | | | | |
| P | Append a letter P to the end of an item ID to indicate that the 4X register should be written to using Function 6. This option may be used in conjunction with a U . When doing so, the P should be placed after the U . This option is available only with the Modbus Ethernet PLC and Modbus Serial devices. | | | | |
| ZZ | Append a forward slash followed by an integer to the end of an item ID to access an individual bit in a 3X or 4X register. The valid range for the bit index is 0 to 15 or, 0 to 31 if the D modifier is specified. These items are always read-only. | | | | |
| A | Append an “A” to the end of an item ID to indicate that the item should be parsed as an | | | | |

| Field | Description |
|-------|--|
| | ASCII String. |
| :N | Append a ":N" to the end of the item ID to indicate that the item should be an array of N elements starting from register YYYYY. |

Table 19 - Available Item Options

* The syntax does not support items with a combination of **D**, **F**, and **U** modifiers. Although the Tag Studio allows these items to be added, the last letter in the combination is all that will be interpreted when reading values. For example, **Port.Device.X:YYYYYDU** will act as an unsigned 16-bit value as the **D** is ignored.

** Registers 3W and 4W are provided in case your unit does not conform to standard Modbus design. They should only be used in your Modbus unit uses the non-standard larger 32-bit registers. Since 32-bit register design is not part of the standard Modbus protocol, we cannot claim to successfully support his mode for any particular device.

Examples

Consider the configuration shown in Figure 17.

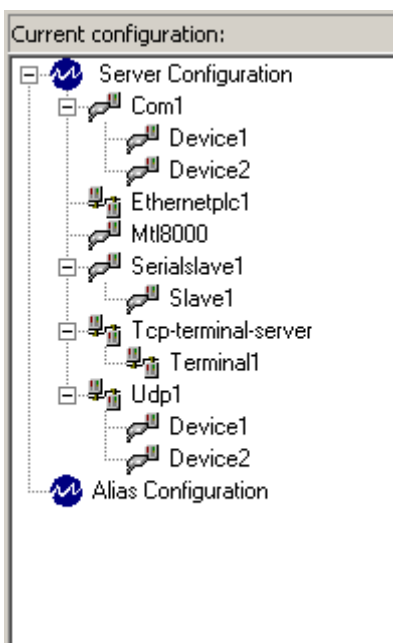


Figure 17 - Configuration Example

The Sample Item IDs shown in Table 20 are examples that could be created from the configuration shown in Figure 18.

| Sample Item ID | Description |
|---------------------------|--|
| Com1.Device1.3:1 | Analog Input (AI) register 1 on serial device Device1 communicating using serial port Com1 . |
| Com1.Device2.4:3P | Analog Output (AO) register 3 on serial device Device2 communicating using serial port Com1 . All writes to this register will be done with Function 6. |
| Ethernetplc1.3:7FS | AI register 7 on device Ethernetplc1 as a 32-bit IEEE |

| Sample Item ID | Description |
|--|--|
| | float-point real with the words swapped (register 8 contains the least significant word). |
| Ethernetplc1.4:8UP | AI register 8 on device Ethernetplc1 as an unsigned 16-bit integer and using Function 6 to write. |
| Serialslave1.Slave1.4:231F | AO register 231 on device Slave1 communicating on serial slave connection Serialslave1 as a 32-bit IEEE float-point real. |
| Tcp-terminal-server.Terminal1.1:3DS | DI coil 3 on device Terminal1 communicating on TCP/IP connection Tcp-terminal-server as a 32-bit integer with the words swapped (register 4 contains the least significant word). |
| Udp1.Device1.0:4/3 | Bit 3 of Digital Output (DO) coil 4 on device Device1 communicating on UDP connection Udp1 . Note: Although the DO register file is normally writable, since this ItemID specifies a bit, it is <i>read-only</i> . |
| Udp1.Device1.1:4U | DI coil 4 on device Device1 communicating on UDP connection Udp1 as an unsigned integer. |
| Udp1.Device2.1:9D/31 | Bit 16 of DI coil 9 on device Device1 communicating on UDP connection Udp1 as a 32-bit integer (actually bit 15 of register 10). |
| Udp1.Device2.1:9DS/31 | Bit 16 of DI coil 9 on device Device1 communicating on UDP connection Udp1 as a 32-bit integer (actually bit 15 of register 9 since the words are reversed). |

Table 20 - Sample Item IDs

Limitations

MatrikonOPC Modbus Driver has the following limitation:

1. **Array data type OPC items** – OPC items with a data type of Array are read-only.

Refer to the *MatrikonOPC Modbus Driver Release Notes* for known issues.

Troubleshooting

The following section addresses some of the most common problems encountered, and questions asked, while using this OPC product. Please check the following **Problems/Solutions** and **Questions/Answers** sections before contacting the MatrikonOPC Support team.

Problems and Solutions

"This item is set to broadcast (address 0)" error message

Problem: While configuring Modbus, I get an error stating "This item is set to broadcast (address 0)".

Solution: If the Modbus address is set to **0**, this indicates that the device link is configured for writing to all Modbus slaves that are available. **When using a Modbus address of 0, you cannot read tags through the device link. Change the address to match the address of the Modbus slave from which you wish to read data.**

Trouble communicating through a network

Problem: Problems communicating to the Modbus device through a network.

Solution: Make sure users can ping the device.

1. Use **Start -> Run** with the command **CMD** to bring up a command window.
2. In the command window, enter:

```
Ping ipaddress ( e.g. C:\temp>ping 127.0.0.1
Pinging 127.0.0.1 with 32 bytes of data:
Reply from 127.0.0.1: bytes=32 time<10ms TTL=128
Reply from 127.0.0.1: bytes=32 time<10ms TTL=128
Reply from 127.0.0.1: bytes=32 time<10ms TTL=128
Reply from 127.0.0.1: bytes=32 time<10ms TTL=128
Ping statistics for 127.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms)
```

 Where **ipaddress** is the IP address of the user's Modbus device. If it says "*no response*", then there are likely network issues between the user's computer and the Modbus device.
Note: Refer to the **DCOM Manual** to further diagnose any DCOM issues.

Minimizing communications to the devices

Problem: I need to minimize communications with my device.

Solution: Consider which items change frequently and which do not. Having your OPC client or clients read different items at different rates (different OPC group update frequency) can result in reduced communications.
 If some items are not needed for a considerable period, consider having your OPC

client either remove them or disable/deactivate them. MatrikonOPC Modbus will not scan items unless they are actively demanded by at least one OPC client.

Group items together sequentially. Modbus will send one packet to read sequential registers. For example:

Reg 1

Reg 2 1 read (because registers are sequential)

Reg 3

Reg 1

Reg 3 3 reads (because registers are not sequential)

Reg 5

Trouble scheduling poll cycles

Problem: I need more options to schedule my polls at specific times or better manage the fairness of data access among devices.

Solution: MatrikonOPC SCADA Modbus allows significantly more configuration options and is preferable in SCADA environments.

Noisy communications

Problem: I am having interference problems when communication with my SCADA devices.

Solution: MatrikonOPC Modbus has some head and tail squall squelch capabilities. Consider using MatrikonOPC SCADA Modbus for enhanced features.

Reads and Writes time out

Problem: My device does not seem to want to communicate. All of my Reads and Writes time out.

Solution: Check your configuration to make sure it matches the configuration of your Modbus device. In particular, make sure that the data/parity/stop settings match (serial), make sure you are using the correct node number or numbers, and make sure you have the correct IP address and port number (Ethernet Modbus).

If your device is a Daniel (32-bit) device supporting Modbus-like protocol, you will need to use the 3W and 4W registers because this device will send and receive twice as much data per register as a normal Modbus device.

If the time outs are occurring because your connection is slow, increase the **Reply Timeout** field value in the **Configuration** panel. This will increase the amount of time before a time out takes place.

Questions and Answers

What is RS-485/RS-422 and can I connect it to my computer's serial port?

Question: I don't have any familiarity with RS-485/RS-422. Is it similar to RS-232? How can my computer talk to an RS-485/RS-422 device? Can I connect it to my computer's serial ports?

Solution: Computers come standard with RS-232 serial ports. RS-485 serial ports must either

be specially purchased, or an RS-232/RS-485 converter must be purchased. RS-485 and RS-422 allow you to serially chain all of the devices to a single communications port. The devices then take turns on the communication port. This allows reduced cost due to having to provide only a single communication port. Also results in reduced bandwidth since the total bandwidth provided to all devices cannot exceed the bandwidth of the communications port.

Should I be using the 3W and 4W registers, or the 3 and 4 registers?

Question: What should I be using – 3W and 4W registers, or the 3 and 4 registers?

Solution: The difference between 3W and 4W registers is the assumption as to the width of one register point. For example, in standard Modbus devices, register 4:1 will send and receive 16 bits of data. Daniel devices using a variant of the Modbus protocol 9 also called Daniel Modbus) use 32-bit registers, and send and receive 32 bits for each register requested or sent. The actual protocol is different, and they are mutually incompatible. A standard Modbus device will not correctly accept data fed to it using the 3W and 4W registers, and a Daniel Modbus device will not correctly accept data fed to it using the 3 and 4 registers.

Your Modbus device *User's Manual* should indicate whether the device registers are standard (16-bit) or Daniel (32-bit).

Generally, if one type does not work, try the other.

Search the *MatrikonOPC Support Knowledge Base* at www.opcsupport.com to find the answers to other commonly-asked MatrikonOPC Modbus Driver questions.